"Advances in Information Technology and its impact on management security issues with respect to selected telecom Industry"

A Synopsis

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*(*Ashish Kumar Lamba)

(Research Scholar*)*

Enrolment No- IIMTU/2167436 *Roll No. 2167003003*

Under the guidance of

Dr. MOHAMMAD KASHIF

Designation: Associate Professor & PhD Coordinator

School of Commerce and Management

IIMT University, Meerut

(School of Commerce and Management)

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IIMT University, Meerut

Objective of the study

Rapidly advancing technology in telecommunications are increasingly concentrating on maximising their profits while also expanding their businesses virtually at a quick rate. After Covid pandemic as virtualization is the first choice of customer and end-user. The goals of the supply chain are integrated with those of the suppliers, information flow management, and capital management, as well as inter-collaboration with other businesses. Furthermore, the social, economic, and environmental dimensions of risk all have an impact on the sustainability. The supply chain for telecommunications is linked to the surrounding environment, which means that unpredictability provides significant risks and problems to the companies, that provide the services. These new innovations have the potential to have a significant influence on both individuals and society. The fast speed of globalisation has contributed to a rise in the level of complexity of the threats that contemporary businesses must contend with. New dangers appear on a regular basis, and they are often associated with and brought about by the increasingly prevalent use of digital technology.

1. Introduction

After the new economic strategy was introduced in India in July 1991, the country's telecommunications industry announced that it would be open to competition from private businesses. The participation of private enterprises in the market necessitated a higher level of regulation. As a direct result of this need, the Telecommunications Regulatory Authority of India (TRAI) came into being in 1997 with the intention of regulating the various telecom service providers. The Telecom Regulatory Authority of India (TRAI) came up with a variety of rules and guidelines in order to turn the monopolistic telecommunications sector into a competitive one that is available to more commercial service providers. Therefore, sustainability supply chain management can be defined as the systematic integration of key business processes to improve the short-term and long-term performance of individual companies and their supply chains, in addition to the accomplishment of economic, social, and environmental goals.

In addition, as a result of the rapidly advancing technology and the intense level of rivalry within the market, the firms that deal in telecommunications are increasingly concentrating on maximising their profits while also expanding their businesses at a quick rate. These new innovations have the potential to have a significant influence on both individuals and society. In addition, the goals of the supply chain are integrated with those of the suppliers, information flow management, and capital management, as well as inter-collaboration with other businesses. Furthermore, the social, economic, and environmental dimensions of risk all have an impact on the sustainability. Nevertheless, the supply chain for telecommunications is linked to a few risk issues that are relevant to the health and safety of the general population. In the same way, the supply chain for telecommunications is linked to the surrounding environment, which means that unpredictability provides significant risks and problems to the companies that provide the services. As a result, it should come as no surprise that telecommunications businesses are eager to implement environmentally friendly policies. It is common for economic, safety, and health measures in the operations of the supply chain for telecommunications to be restricted, which results in complications. This is especially true in developing nations. For instance, the 2G and 3G frauds caused a fall in the stock values of every single telecommunications business. Who had an effect not only on the corporations that were participating in the 2G and 3G frauds, but also on the companies that were not participating in either scam. In addition to this, as a direct result of these cons, investors have lost faith in the whole telecommunications industry. In a separate instance, in terms of human health, the Environmental Protection Agency (EPA) report-2018 states that the radiation signals emitted by mobile phones during voice calls and messages transmitted through the air can build up in the human body, have a detrimental effect on the nervous system, and pose a significant risk for both the current generation of humans and the generation that will come after them. Another important aspect of the service supply chain is the unpredictability of the demand. Additionally, solid estimates of the prospective capacity need in the telecommunications industry are difficult to make due to considerable challenges posed by an unpredictable market as well as short life-cycle services. The management of these kinds of hazards from a variety of perspectives has been the subject of several efforts made by companies. In reality, the majority of the long-term risk factors are often associated with one another. For instance, environmental problems such as elevated levels of radiofrequency in the air can have a negative impact on human health. These problems can also have a negative impact on a company's reputation, which can lead to decreased

sales and revenue, as well as affect the power of the brand and cash flow. These sorts of hazards have the potential to affect the interactions that occur between the various supply chain operations.

1.1 Industrial Risk Management

The process of detecting, evaluating, and mitigating potential risks to the assets and profits of an organisation is referred to as risk management. These dangers might originate from a wide number of places, such as unpredictability in the financial sector, potential legal repercussions, challenges posed by emerging technologies, oversights in strategic management, unfortunate events, and catastrophic natural occurrences.

An effective risk management programme enables a company to think about the entire scope of the dangers to which it is exposed. In risk management, the link between risks and the influence that risks might have on an organization's strategic objectives is also investigated, as is the possibility that risks could have a cascade effect.

Because of its focus on predicting and understanding risk across a company, this comprehensive approach to risk management is also referred to as enterprise risk management. Enterprise risk management (ERM) places an emphasis on the need of managing positive risk in addition to a focus on the management of internal and external threats. Opportunities that have a positive risk of either increasing corporate value or, alternatively, causing harm to an organisation if they are not pursued. In point of fact, the objective of any risk management programme is not to eradicate all risks but rather to maintain and increase corporate value via the use of astute risk judgement.

As a result, a programme for risk management needs to be integrated with the strategy of the firm. In order to connect them, the leaders of risk management must first identify the company's risk appetite, which may be seen as the amount of risk the business is prepared to tolerate in order to achieve its goals.

In his post on risk appetite vs. risk tolerance, Notre Dame University Senior Director of IT Mike Chapple said that the next difficult challenge is to identify "which risks fall within the organization's risk appetite and which need extra controls and measures before they are

acceptable." Some risks will be taken with the understanding that no further action is required. Some of them will have their negative effects lessened, shared with or passed to another party, or completely avoided.

Every company runs the danger of unforeseen, negative occurrences that might either lead it to lose money or force it to cease operations entirely. Companies that were disrupted by born-digital powerhouses like Amazon and Netflix can testify to the fact that failing to take risks may also spell doom for a business. This handbook to risk management offers a thorough summary of the fundamental ideas, needs, tools, trends, and arguments that are driving this rapidly evolving area. The reader should make sure to click on the hyperlinks that lead to other articles on TechTarget that provide more in-depth information on the issues that are discussed here in order to get further knowledge on the subject matter.

1.2 Risk Management Important

There has probably never been a time in history when risk management has been more vital than it is right now. The fast speed of globalisation has contributed to a rise in the level of complexity of the threats that contemporary businesses must contend with. New dangers appear on a regular basis, and they are often associated with and brought about by the increasingly prevalent use of digital technology. Experts in risk have referred to the effects of climate change as a "danger multiplier."

A recent external risk that manifested itself as a supply chain issue at many companies the coronavirus pandemic quickly evolved into an existential threat, affecting the health and safety of their employees, the means by which they do business, the ability to interact with customers, and the reputations of the corporations themselves.

In response to the dangers presented by the epidemic, businesses acted swiftly to make modifications. However, moving ahead, they are wrestling with new issues, such as how and when to bring people back to the office and what should be done to make their supply networks less sensitive to crises. In addition, they are pondering what should be done to make their supply chains more resilient.

Companies and their boards of directors are taking a new look at the risk management plans they have in place as the globe continues to grapple with the implications of COVID-19. They are revising their risk exposure and reviewing the risk management systems already in place. They are rethinking the individuals who should be a part of the risk management process. Companies that currently take what is known as a reactive approach to risk management are contemplating the potential competitive benefits of switching to a more proactive strategy. This involves taking precautions against risks that have already occurred and altering business practises only after a new risk has caused damage. Supporting sustainable practises, resilience, and corporate agility are becoming more popular areas of focus. The use of artificial intelligence technology and sophisticated governance, risk, and compliance (GRC) systems are also being researched by businesses as potential ways to enhance risk management.

Financial vs. nonfinancial industries. When it comes to debates about risk management, many industry professionals point out that the management of risk is a formal role at businesses that are extensively regulated and whose primary focus is risk. Large risk departments have been commonplace in financial institutions like banks and insurance firms for a long time. These departments are often directed by a chief risk officer (CRO), a position that is still unusual outside of the financial sector. In addition, the risks that financial services organisations face are often based on numbers, and as a result, they are able to be quantified and properly examined by making use of well-established procedures and established technologies. Risky situations in financial institutions are amenable to modelling with a degree of accuracy.

According to Gartner analyst Matt Shinkman, who leads the company's enterprise risk management and audit practises, risk in other industries tends to be more qualitative and is therefore more difficult to manage. This increases the necessity for a deliberate, thorough, and consistent approach to risk management. The goal of the programmes designed for enterprise risk management is to assist businesses in being as risk-savvy as they possibly can be.

2. Literature review

Chen, W. K., Nalluri, V., Ma, S., Lin, M. M., & Lin, C. T. (2021), Because of the complex nature of sustainable supply chain management, a variety of potential risk factors might come from different sources. Because of their limited resources, the company that provides telecommunication services cannot apply many improvement initiatives all at once in order to counteract the risk factors. The industries need to conduct an analysis of the relationships between the various risk variables and investigate the elements that determine the effectiveness of various improvement strategies. Using interpretative structural modelling, the goal of this research is to identify and assess critical risk factors (CRFs) for the purpose of improving sustainable supply chain management procedures in the Indian telecommunications sector (ISM). A literature review is used to identify risk factors, and then a fuzzy Delphi technique is used, together with the assistance of subject matter experts, to identify nine critical risk factors (CRFs) (FDM). ISM was used to do an analysis of the connection among these CRFs, during which both the driving power and the reliance power of those CRFs were evaluated. According to the findings, "government policies" (including rules and regulations) and "the influence of fast change in technology" are both independent or essential elements that affect the viability of the supply chain for telecommunications services. In addition, the findings have significant managerial implications, such as improved sustainability, and the government should work to establish justice, fairness, open laws, certainties, and regulations to prevent risk in the supply chain of the telecommunications industry. Additionally, service providers should keep an eye on the rapidly advancing technologies and place an emphasis on technical learning and organisational capacity development in order to counteract the effects of technological shifts. This study's contribution is the use of a novel approach to establish a hierarchical structural model for an effective understanding of CRFs relationships and to explore decisive risk factors that can assist telecom service providers in better planning and designing effective improvement strategies to enhance sustainability supply chain management. Using this approach, the study was able to explore decisive risk factors that can assist telecom service providers in better planning and designing effective improvement strategies.

Suarez-Paba, M. C., & Cruz, A. M. (2022), An upward trend in the number of natural hazards that were reported to have triggered technological accidents (Natechs) around the world has led to the development of contributions in the areas of natural hazard-triggered technological accident risk

assessment and management, risk reduction and emergency response strategies, risk communication, risk perception, and risk governance. However, despite the fact that a number of studies have emphasised the importance of resilient industries, it is only relatively recently that researchers have called for an area-wide perspective. This calls for a paradigm shift in Natech risk management, which fosters an approach that is more holistic in nature. This strategy should take into account the facilities and the environment that surrounds them, and it should also stimulate interaction between many stakeholders in order to promote more resilient communities. However, there are currently no methodologies for evaluating, rating, and certifying the level of preparedness that industrial facilities have to Natech risk. In addition, there are no tools that are available to inform governments and the public on the practises that industry uses to manage Natech risk. In response to this need, we have come up with the concept of Natech RateME, an all-encompassing risk management and rating system framework for the region. In order to support industrial facilities' management of onsite and offsite risk from complex events, the proposed framework is predicated on a probabilistic risk assessment methodology. This methodology rates the facilities' performance in terms of minimum life losses and can support industrial facilities' risk management. The framework and the rating system aim to contribute to the overall resilience of the territorial area by evaluating a company's safety performance, their engagement to develop cooperation mechanisms with local authorities and neighbouring communities, and their commitment to disclose risk information, among other aspects. Natech RateME is the first approach to support the strengthening of prevention and mitigation measures by enhancing facilities' and governments' abilities to manage Natech risk comprehensively. To achieve this goal, Natech RateME takes into account the interaction between the infrastructure systems present at industrial parks, the technical and organisational systems, governance, risk communication, and community participation.

Emami, A., Welsh, D. H., Davari, A., & Rezazadeh, A. (2022), For knowledge-intensive organisations, the formation of a strategic partnership may be a useful competitive strategy. However, there is a paucity of information regarding the operational dynamics of strategic alliances within smaller companies operating in the telecommunications sector, which is an essential component of the COVID-19 pandemic infrastructure. The objective of this study is to investigate the effect that strategic alliances have on the levels of firm performance that are

achieved by small entrepreneurial firms (SEFs) operating in the telecommunications industry. The primary data for this study was collected from a sample of 74 small entrepreneurial firms operating in the telecommunications industry. The data was analysed using structural equation modelling (SEM). Our research indicates that small entrepreneurial businesses operating in the telecommunications industry can benefit significantly from forming strategic alliances, as these alliances have a significant and positive impact on the partners' performance in terms of financial, operational, and organisational efficiency. Based on the findings, we advise small businesses with an entrepreneurial spirit to pay special attention to pre-alliance and post-alliance issues. These issues include partner similarity, alliance experience, partner reputation, complementary skills, industry scope, commitment to improving trust and skill, and collaboration to boost performance. In addition, based on the findings of this study, we discuss the research implications for difficulties faced by SEFs in the field of telecommunications during the pandemic crisis caused by COVID-19.

Lee, J., & Lee, D. K. (2018), It is difficult to establish a complete management framework to control the risk from natural hazards because of the broad regions that are impacted, the unpredictability of natural disasters, and the participation of a wide variety of stakeholders. The application of risk management practises that have been shown to be effective in the industrial sector can help with the systematic identification of hazards and the quantitative assessment of risks posed by natural hazards, thereby facilitating the promotion of interactive risk communication with the general public. This study's goals are to (1) explain risk analysis techniques that are often used in the process industry and (2) identify ways in which such techniques might be utilised in the context of the management of natural catastrophes. In particular, the use of Hazard and Operability (HAZOP), Safety Integrated Level (SIL), and Quantitative Risk Analysis (QRA) was explored since these methodologies are utilised in the performance of significant studies in the industrial sector. We offer case studies of the use of HAZOP to detect climate-related natural hazards, as well as studies of SIL and QRA that were undertaken to give quantitative risk indicators for the management of landslide risk. Both sets of studies were carried out in order to provide information. Through the establishment of a more systematic context and the facilitation of risk communication, the analyses that were provided in this research may offer a valuable foundation for enhancing the risk management of natural disasters.

Kalem, G., Vayvay, O., Sennaroglu, B., & Tozan, H. (2021), The evolution of 3G and Long-Term Evolution (LTE) has brought a remarkable advantage to mobility-based digital solutions by providing ubiquitous Internet services to a multitude of users with varying needs. This has resulted in an increase in the number of users who can take advantage of these solutions. In today's world, the rapid proliferation of smart gadgets and the ever-increasing use of mobile internet have both contributed to the acceleration of efforts geared toward the creation of a 5G ecosystem for mobile technology. As a result, participants in the industry must base their management choices and strategy development on projections that are associated with the deployment of 5G technology. In the field of mobile telecommunications, a better knowledge of technical forecasting and the technology life cycle is one of the primary goals of this line of study. In particular, the research was conducted in Turkey with the goal of making a contribution to the area of engineering management on the subject matter. This contribution will be realised through the forecasting of the ideal launch time of 5G services for a leading telecommunications company in the market, which has been integrating new mobile technologies and densifying its existing network at a rate that has never been seen before in the past few years. According to the facts that we have gathered, the month of August 2020 would be the ideal moment for Turkey to start the rollout of 5G technology and begin offering mobile telephone services. At this point in time, the majority of the prediction factors that are used in the process of deciding how much to spend in a network are projected to have reached maturity.

Zhao, M., Zeng, Q., Chang, M., Tong, Q., & Su, J. (2021), The loss of clients will result in a reduction in the value that firms get from their customers. If the company continues to have a high rate of client turnover, it will progressively lose the edge it now has over its competitors. When the increase in new consumers is not sufficient to fulfil the requirements of company expansion, the enterprise will find itself in a precarious position regarding its ability to continue existing. This paper takes the telecom industry in China as the research object, establishes a customer churn prediction model by using a logistic regression algorithm based on the big data of high-value customer operation in the telecom industry, effectively identifies the potential customers who will churn, and then puts forward targeted win-back strategies based on the empirical research results. The focus of this paper is on the customer churn prediction model. Through the use of data mining

algorithms, this article provides an analysis of the patterns and factors that contribute to customer churn, as well as answers to questions such as how customer churn occurs, which factors have the most impact on customer churn, and how businesses can win back customers who have already left. The findings of this study have the potential to improve the practise of customer relationship management in the telecommunications industry. Additionally, the findings of this study can serve as a reference for the telecommunications industry, allowing it to identify customers at high risk of churning in advance, increase customer loyalty and viscosity, maintain "high-value" customers, continue to provide customers with "value," and reduce the cost of maintaining customers.

Elapanda, S., Adinarayana Rao, U. V., & Sravan Kumar, E. (2020), Artificial intelligence has quickly become the buzzword of choice among those who work in the IT industry today. Because of its precision and dependability, it is the greatest option for businesses that are driven by technology. The biggest firms in the telecom industry all over the world are responsible for the majority of the investment that is being made in AI at the moment. Because of the potential it has to bring economies all over the world together and make their operations more straightforward, the telecommunications sector is seeing considerable growth. As a result of this, there has been a meteoric rise in the demand for AI among businesses that are serious about maintaining or improving their standing in the global competitive landscape. Artificial intelligence (AI) is now the focus of a significant amount of investment and resource mobilisation on the part of businesses. Even corporations are devoting a significant amount of capital to artificial intelligence research in order to investigate potential future technologies that may result in game-changing improvements. In this context, we discuss the potential possibilities of automation through AI in telecom service management and its benefits through a self-healing platform with preventive and corrective solutions management. In addition, we look at some of the challenges that may arise from implementing automation. During the course of the study, we ran into a few issues with the design of the product, which we resolved with the help of several risk management methods.

Yalla, S. P., Bhattacharyya, S. S., & Jain, K. (2018), After 1991, due to the introduction of liberalisation and economic reforms, the Indian telecom sector witnessed a remarkable growth in terms of subscriber base and reduced competitive tariff among the service providers. This growth was a direct result of the liberalisation and economic reforms that were implemented. The objective

of this study is to provide an assessment of the effect that regulatory pronouncements have on the level of systemic risk experienced by Indian telecom companies. In order to quantify the effect that regulatory pronouncements have on systemic risk, the approach for this research consisted of two steps. In the initial stage of the process, CAPM and the Kalman filter were used to make an estimate of the daily (systemic risk). The influence of regulatory pronouncements on daily values produced from the first phase was evaluated using a technique known as event study in the second step. According to the findings of this research, regulatory notifications do have an effect on the level of systemic risk among telecom companies. The research also discovered that regulatory announcements either raised or lowered systemic risk, depending on the sort of regulatory announcements that were made. [Citation needed] [Citation needed] Additionally, the market-perceived regulatory risk premiums for particular telecom companies were analysed and assessed in this research. The regulatory risk premium was either good or negative for the companies in the telecom industry, based on the various kinds of regulatory notifications made to the companies in that area. As a result, the buffering hypothesis is put to the test in the context of Indian telecom companies thanks to the findings of this research, which makes a contribution to the theory of literature. The results of the research would be helpful for investors and policymakers when estimating the regulatory risk premium in the Indian telecom industry whenever there is an expected regulatory announcement. One of the earliest research projects ever conducted to investigate the regulatory risk faced by Indian telecom companies is presented here. According to the conclusions of the study, there is indeed regulatory risk present in Indian companies that are in the telecom industry.

Rasheed, S., ChangFeng, W., & Yaqub, F. (2015), The purpose of this study is to explore the principles of risk management and its implications for the management discipline known as programme management. It emphasises the differences between projects and programmes and explores the factors that contribute to the increased risk associated with programmes. In addition, we report a number of perceived barriers en route for risk management implementation on ground, as well as the reasons and rationales behind such infirmities, which are based on relevant descriptions and findings from respective literatures. These descriptions and findings are based on relevant research. The primary elements that contribute to impoverished risk management may be broken down into four primary categories: learning defects, resource limits, contextual restrictions,

and human limitations. According to the findings of an empirical survey-based study that was carried out with Pakistan telecom professionals, the topmost barriers that impede the implementation of risk management in large-scale telecom programmes in the country are monetary constraints, schedule compels, unstable organisational environment, lack of executive's commitment towards risk, and a deficit of risk-aware culture. This study was carried out in Pakistan. The findings delineated later in this study can equip the relevant stakeholders with a better learning of the affairs prevalent in Pakistan's telecom industry. This may also assist policy makers in enacting corrective actions. The concepts that were defined in the earlier parts of this study will enable practitioners to have a better understanding of the subject of programme risk management.

Júnior, I. G., & Chaves, M. S. (2015), This article addresses concerns of scope and organisational hazards in information technology projects that are taking place during the merger phase in telecommunications businesses and provides strategies for risk reduction. In the context of an exploratory case study, it utilises an interpretative epistemology. The investigation yielded a number of suggestions for reducing the risks that were discovered, as well as a list of the specific dangers that are associated with implementing IT initiatives during this time period. The theoretical contribution is a list of risks that could occur during the merger of two or more telecommunications companies. With regard to the practical part, this contribution enables project managers to apply the identified findings and mitigations to the risk management of information technology projects taking place in an environment that is analogous to the one being studied.

Kozarević, S., & Bešić, N. (2015), Over the course of the last several decades, the problem of risk management has evolved into a component of the daily operations of every firm that has become an increasingly significant part. These points of view are becoming increasingly widespread in the service sector, which is responsible for an ever-increasing proportion of the GDP not just in individual nations' economies but also on a worldwide scale. When compared to tangible products, services have a number of distinct characteristics that call for a different approach to the activities that fall under the purview of risk management. This is especially true in the case of capital-intensive services like those provided by telecommunications companies. Some of these characteristics include: This category of services is primarily offered within large corporations

because those businesses have a greater need to focus their attention on the process of risk management, beginning with the identification and evaluation of risks and continuing all the way through to the selection and implementation of the most suitable risk management method. Methods for risk management may be broken down into two categories: those that deal with the physical control of potential hazards, and those that deal with the financial aspect of potential dangers, such as risk retention or insurance. All of these strategies have the potential to be used on a diverse range of personal, property, and liability risks that are faced by firms and people working in the telecommunications industry. With the help of a case study of the most successful telecommunications service provider in Bosnia and Herzegovina, this article makes an effort to offer an overview of the particular aspects of risk management in the businesses that operate within the telecommunications sectors.

Kanev, V. S. (2014), The purpose of this study is to analyse the challenges of system risk management in the field of telecommunications in the Siberian area of the Russian Federation, as well as the particulars of the sector, its risk profile, and the potential for risk management. Management of qualitative and quantitative risks, diagnosis and modelling of operational losses using Bayesian networks; qualitative and quantitative risk analysis. Evaluation in a methodical fashion of the communication and information and communication technologies' respective risk profiles and their capacities for risk management, with a focus on the highlighted elements of these areas for risk management. It has been determined when and how the feasible qualitative and quantitative risk management, what the techniques of management and gauges risk modelling capabilities are, and what the viewpoint of risk circumstances are. Cawthra shows the trend in the integration of risk management functions and automation of these functions in a single model by monitoring the measuring complex to the nucleus in the centre using Bayesian decision support technologies in his analysis of Russian and international risk management practises in the telecommunications industry. The combination of qualitative and quantitative risk management allows for the identification of distinct aspects of the risk profile of the telecommunications industry. It has been assessed whether or not the use of Bayesian technology in continuous risk management is feasible. Analysis is done on the experience that telecom businesses now have available in risk management. adequate description of effective processes for integrated risk management systems in the sector that is undergoing fast expansion; this would have a significant

impact on the pace of economic expansion across the board. Practical value. In the field of telecommunications, the development of automated integrated risk management systems will have their foundation laid by the methodologies and components that make up the risk management approach. With this kind of computer architecture, preventative risk management for telecom companies would be efficiently organised.

Gandini, G., Bosetti, L., & Almici, A. (2014), Companies face an ever-increasing number of threats as a direct result of globalisation. As a result, the capacity to avert dangers and seize opportunities is becoming an increasingly important strategic factor in the success of businesses. However, companies that operate in the same sector may choose from a variety of risk management strategies to meet their needs.

This piece will concentrate on the many telecommunications businesses operating in international markets. These kinds of businesses contribute to the globalisation of markets by easing the flow of information and promoting the exchange of knowledge; however, they are also subject to a wide range of risks that are imposed on them by legislative restrictions and are associated with the social and environmental impact of the processes they carry out. The article focuses on the capacity of telecommunications firms to manage risks in a globally responsible manner, which is dependent on the ability of these organisations to expand in a sustainable manner. This is done via empirical research as well.

Rasheed, S., ChangFeng, W., Yaqub, F., Rafique, K., & Di, Z. (2014), Although risk management is an essential prerequisite for the success of any effort, it is of the utmost importance to strike a balance between the hazardous contexts that are present in the programmes in order to realise the organisational goals and objectives. Because the programmes indicate a unique position in the organisational structure, they need the adoption of specific risk management strategies. Because developing new methods of communication is an endeavour that is both dangerous and difficult, it is necessary to implement stringent controls in order for these programmes to be successful. This research intends to adopt a specific programme risk management technique for a large-scale development programme in Pakistan's telecom sector. That programme is called the Next Generation Wireless Mobile Services project. The suggested method adheres to the conventional steps involved in risk management in an orderly fashion, makes use of specific decision-making

tools, and makes an effort to strike a balance between the risks that the programme faces. It exhibits how various information collecting concepts together with prominent methods such as the Analytical Hierarchy Process, the As Low as Reasonably Practicable reasoning, and the Standard Deviation thoughts may be used for the purpose of balancing the dangerous environments in the subject programme. The findings demonstrate a significant improvement in the risk exposures associated with the aforementioned telecom programme and validate the approach that is being provided. This strategy may also be helpful in the management of risks in a wide range of other programmes that are on a larger scale.

Nesse, P. J., Svaet, S. W., Strasunskas, D., & Gaivoronski, A. A. (2013), Computing in the cloud signifies a significant shift in the manner in which information technology resources are distributed and used. This shift will have an impact on the telecommunications sector, its upcoming services, business offers, and the economics of the industry. However, new income potentials from mediating cloud-based services have received less attention than they might have, and there is a dearth of a methodology that is both generally recognised and fully developed for this purpose. The purpose of this paper is to propose a methodology for analysing and optimising new business prospects as well as to clearly outline preferred roles for telecommunication companies (telcos) in the cloud value chain. Both of these goals will be accomplished if the study is successful. In particular, we demonstrate how the portfolio theory of contemporary investment science may be used to help risk management in the operation of cloud carriers that are based on telecom companies in order to broker services.

As a preferred cloud business model for a telecom, we suggest taking on the role of both a broker and a carrier simultaneously. It is anticipated that this combination would constitute the most compelling value proposition when competing against cloud providers and ICT integrators. Further quantitative study reveals that distinguishing and optimising the offering of carrier grade and best effort network connection types for a particular bundle of cloud services may result in considerable advantages for businesses. These benefits include cost savings and increased productivity. This addresses a rising need for network performance in the commercial sector and suggests an effective use of telecom infrastructure.

The proposed quantitative optimization model as well as the analytical identification of the ideal telco function in cloud value networks are the two aspects of the article that contribute significantly to its originality. The implementation of this study in the real world might lead to an improvement in the dimensioning of technical assets, which would result in a greater cost efficiency and potentially an increased level of customer satisfaction.

Sedinić, I., & Perušić, T. (2015), The basis and the first point of departure for the execution of security measures in every business is security risk management. This in and of itself is a problem. However, in more complicated companies, there are additional issues, such as how to integrate the IT Security Risk Management with the whole Security Risk Management and then with the Company's overall Risk Management. In the event that an organisation is a subsidiary of an international business, in addition to abiding by the laws and regulations that apply to it, it must also adhere to the firm's internal rules. In the telecommunications business, daily operations make it very necessary that security evaluations be able to be carried out in a short amount of time in order to provide support for operational choices. In addition to all of these challenges, Croatian Telecom, which is a subsidiary of Deutsche Telecom Group and is certified to meet the criteria of ISO 270001, is also dealing with a number of other concerns. In order to overcome this obstacle, the Company came up with three distinct approaches to the management of information security risks. Every one of these approaches has been combined into a single Risk Register, and it has also been matched up with the Company's Risk Management. In this paper, each Information Security Risk Management methodology will be described, along with its application area. Additionally, this paper will discuss how recognised security risks are displayed in a common Risk Register, as well as how these risks relate to the risk management practises of the company.

Ngugi, P. N. (2013), The purpose of this research was to investigate the preferred supply chain risk management strategies of the mobile communications firms in Kenya, as well as the efficacy of these practises and the difficulties these businesses experience while adopting supply chain risk management. In order to achieve the goals of the research project, a survey was carried out at each of Kenya's four mobile telecommunications operators. SPSS was the research tool that was used, and descriptive statistics were applied to the data in the form of percentages, proportions, and frequency distribution distributions in order to do the analysis. According to the data, the majority

of mobile telecoms businesses have included supply chain risk management into their operations. On the other hand, it was clear that the majority of mobile telecommunication businesses have not given a great deal of attention to the cyber supply chain risk management Plan as a supply chain risk management practise. It was also determined that the most significant obstacles to implementing supply chain risk management in mobile telecommunications companies were the high investment costs in terms of technology, the increasing level of fierce competition within the industry, and the absence of support from the government. According to the findings of the research, all mobile telecoms businesses in Kenya should make it their mission to acquire an in-depth comprehension of the supply chain risk management methods that would propel them to world-class status and protect them from the effects of competition. In addition, the government should provide tax vacations to mobile communications businesses in order to safeguard the sector, which plays an important part in Kenya's economy.

Kisioglu, P., & Topcu, Y. I. (2011), When it comes to the field of telecommunications, having a presence in the market is something that many different businesses consider to be of the utmost importance. The loss of customers is becoming an increasingly important problem for telecommunications firms to address as the level of competition between businesses rises. Instead of focusing on obtaining new customers, businesses should focus on retaining the ones they already have for the most effective customer churn control. Previous studies have concentrated on identifying the characteristics of churning consumers in the telecommunications business in order to forecast their behaviour. Bayesian Belief Network was used to develop a model for the purpose of identifying the behaviours of customers who have a tendency to churn as part of this research project. The information that was utilised was obtained from one of the service providers of telecommunications in Turkey. First, since Bayesian Belief Networks only use discrete variables, the CHAID (Chi-squared Automatic Interaction Detector) method is used to discretize continuous data. This is necessary because Bayesian Belief Networks only use discrete variables. The findings of the correlation analysis, multicollinearity test, and the views of subject matter experts are used to produce a causal map that serves as the foundation of the Bayesian Belief Network. According to the findings of Bayesian Belief Network, the most significant factors that explain customer churn are the average minutes of calls, the average billing amount, the frequency of calls to persons with other providers, and the kind of tariff. At the conclusion of the research project, three distinct scenarios are studied to determine the characteristics of customers who churn, and

recommendations for promotional activities are made in an effort to lower the customer turnover rate.

Viljainen, M., & Kauppinen, M. (2011), The use of ecosystem strategies is becoming more popular among software firms. An open technology platform that has supplementary components developed by a number of different software firms or communities is the essential element of a software ecosystem. To the core products of the platform integrator, ecosystems contribute value via open innovation, despite the fact that they present management issues. Within the context of software ecosystems, this article analyses whether management strategies might benefit platform integrators. Technology scouting, orchestration, management of software supply networks, and management of technological assets are all included in the collection of management techniques that are synthesised from the relevant research in the field. This article provides a well-organized summary of management practises and ties those practises to the technology and innovation management processes. In the context of the telecommunications business, a case study demonstrates how these best practises might be used by platform integrators.

Valinejad, F., & Rahmani, D. (2018), The future of organisations is put in jeopardy when there is insufficient concern for the dangers associated with sustainable supply chains, given that global production and service organisations are moving in the direction of developing sustainable supply chains. On the basis of an innovative strategy for sustainability, this article presents a complete and trustworthy framework for managing the sustainability risks of the supply chain for telecommunications firms. The framework is presented as part of this study. In point of fact, the risks on various echelons of the telecoms supply chain were identified using a five-dimensional approach to the sustainability as a strong and well-known way. This was done based on the fact that this is one of the most effective methods. Using the failure mode and consequences analysis technique, a number of the most important Iranian internet service providers were selected as a case study and subjected to in-depth research and analysis. After determining the underlying factors that led to each risk and the probable repercussions of that risk, a treatment plan that took into account the capabilities of the sector were offered. Because of this, the most significant threats to the long-term viability of the telecommunications businesses under consideration are those of a technological and institutional nature, which together account for roughly 66 percent of the severe

risks. Additionally, suppliers who account for 53% of the key risks faced by these organisations pose the greatest danger to the supply chain's ability to function normally. The suggested framework, which is not only used by managers and specialists in the telecommunications business, but it can also it may be altered to any other industry by connected managers to preserve the sustainability of the supply chain performance over the long term. In addition, it may provide researchers with a platform for doing more investigation in this area in the future.

3. Risk Management Standards and Frameworks

As a result of the expansion of government and industry compliance rules over the past two decades, regulatory and board-level scrutiny of corporate risk management practises has also increased. This has resulted in risk analysis, internal audits, risk assessments, and other aspects of risk management becoming a significant component of business strategy.

How is it possible for an organisation to bring all of this together?

The rigorously created frameworks that are always being refined that have been produced by the risk management profession will be of assistance. Here is a selection, beginning with condensed explanations of the two frameworks that have received the most widespread recognition. Readers can reference the comparison of the security standards ISO 31000 and COSO written by security expert Michael Cobb, which dives into their similarities and differences as well as how to pick between the two:

- **COSO ERM Framework.** Launched in 2004, the COSO framework was updated in 2017 to address increasing complexity of ERM. It defines key concepts and principles of ERM, suggests a common ERM language and provides clear direction for managing risk. Developed with input from COSO's five member organizations and external advisors, the framework is a set of 20 principles organized into five interrelated components:
    - governance and culture
    - strategy and objective-setting
    - performance

- review and revision
- information, communication and reporting

As Cobb notes in his comparison article, COSO's updated version highlights the importance of embedding risk into business strategies and linking risk and operational performance.

- **ISO 31000.** The ISO standard was initially published in 2009 and then revised in 2018. It consists of a process for identifying, evaluating, prioritising, and mitigating risk, as well as a list of ERM principles, a framework to assist organisations in applying risk management mechanisms to operations, and a framework to assist organisations in applying risk management mechanisms to operations. Cobb claims that the most recent iteration of the ISO standard is a "document that is simpler to read since it is shorter, crisper, and more succinct than its predecessor." The 2018 standard, which was developed by the risk management technical committee of ISO and with participation from ISO national member organisations, contains more strategic advice on ERM than the original standard did. The new standard places an emphasis on the significant role that senior management plays in risk management as well as the incorporation of risk management practises at all levels of the business.

- **British Standard (BS) 31100.** The current version of this risk management code of practice was issued in 2011, and it provides a process for implementing concepts described in ISO 31000 -- including functions like identify, assess, respond, report and review.

- **The Risk and Insurance Management Society's Risk Maturity Model (RMM).** The RMM framework is currently undergoing an update, but it is readily available in the original 2006 version. RMM lists seven attributes of a risk management program and helps organizations assess each one on a scale from non-existent to leadership level.

3. Problem Statement

The statement of problem in context of telecom as following which Impact of Rapidly Advancing Information Technology on Industrial Risk Management with Particular Emphasis on The Telecom Industry.

Lack of success in implementing digital transformation and growth plan

The ability of telecom operators to produce revenue growth from digital services is one of the most difficult problems they confront. When looking to capitalise on growth prospects, it may be helpful to develop creative business models, seize chances for inorganic development, new service inclusions, and diversification via mergers and acquisitions as well as strategic partnerships.

Increased pressure from capex

The world's telecommunications companies are now witnessing a new wave of network investment, which includes everything from gigabit fibre and 5G to low-power wide-area networks. However, the returns on this capital expenditure are often questionable. This is due to the fact that sophisticated technologies such as 5G are still in the early phases of development, and the fact that broadband as a utility tends to pose serious challenges to the premium pricing of fibre connection. As a result, it is becoming more vital to make the appropriate decisions about the switch-off, spin-off, and sharing of infrastructure.

Adaptations to the regulatory structure

There is a shift occurring in the regulatory landscape toward placing a greater emphasis on concerns such as data protection. As a direct consequence of this, the conventional burdens placed upon operators, such as wholesale pricing and interconnection, are gradually becoming less strict. On the other hand, various aspects of the rules that apply to telecom carriers are subject to change. In addition, new requirements for businesses in the telecommunications sector are being spawned as a direct result of the government's industrial strategies. The risk assessment specialists that we employ in the telecom sector are of the view that it is essential for operators to strike a balance and successfully navigate the shifting regulation environment.

A lack of sufficient planning and design for the workforce.

In the telecom business, effective personnel management is still not given the emphasis it deserves as a strategic focus area. According to the specialists that do risk assessments for the telecom business at Infiniti, this might prove to be dangerous for participants in the telecom industry. It is essential for telecoms to reshape and reskill the workforce capability in their organisations.

Companies in the telecommunications business need to adopt a comprehensive approach to workforce planning in order to avoid creating organisational silos like these.

Inefficiency in the administration of investment portfolios

According to the findings of a risk assessment conducted by Infiniti on the telecom sector, insufficient planning and management is one of the key reasons why telecom operators are unable to realise the synergies that they anticipate realising as a result of mergers and acquisitions. Because of this, telecommunications service providers need to devise integration road plans that are more adaptable and engage in more astute management of their business portfolios.

How exactly may Infiniti's risk assessment for the telecom business be of assistance?

At the moment, the telecommunications industry is at the forefront of the digital revolution. One of the most important questions that telecommunications firms need to ask themselves at this juncture is whether or not they are seizing the correct chances that are presented to them and concentrating on the proper challenges that need to be met.

5. Objective

Aim: The Impact of Rapidly Advancing Information Technology on Industrial Risk Management with Particular Emphasis on The Telecom Industry

a) Explore the factors which induce the Industrial Risk (In context of telecom Industry)
b) Exploring the Impact of IT on telecom Industry
c) Find out the proper solution to handle out the Management in current scenario of IT.

6. Tool SPSS

7. Methodology

Quantitative Risk Analysis

Chi-squared Automatic Interaction Detector

Theoretical study

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